

## THE DIRECTOR'S REPORT

THE ARNOLD ARBORETUM DURING THE FISCAL YEAR ENDED  
JUNE 30, 1963

THE WORK OF THE ARNOLD ARBORETUM includes the maintenance and study of a collection of living plants, the preservation and use of herbarium specimens and library books, and the pursuit of botanical and horticultural research with the results being made available through publications and by educational programs. In each of these areas the annual records are cumulative. In our northern temperate climate the variations of the environment from year to year are readily observable in the flowering of the trees and shrubs of the living collections. The records of the institution, many dating back nearly ninety years, allow comparisons. The past winter with its unusual ice storms adversely affected some plants, but proved favorable for others, and the spring season was marked by an unusually beautiful flowering display of crab apples, lilacs, and evergreen rhododendrons. An active staff published collectively over 65 papers during the year, while continuing its regular curatorial activities involving the many collections. A large number of educational programs, ranging from lectures and guided tours to courses and correspondence, were also part of another busy year.

**Staff:**

The staff was saddened by the death of Dr. Clarence E. Kobuski, on May 9, at the age of 63. Dr. Kobuski came to the Arboretum in 1927, and his death ended 36 years of contribution to the Arnold Arboretum, interrupted only by wartime service in the United States Army. His was a period of dedication second in length only to those of Charles Sprague Sargent and Alfred Rehder. In his early years he came to know well woody plants under cultivation, as an assistant to Rehder, and later as an editorial assistant in the preparation of Rehder's *Manual of Cultivated Trees and Shrubs* and the *Bibliography of Cultivated Trees and Shrubs*. His research, involving difficult groups, began as studies of cultivated plants in the families Theaceae and Oleaceae. As an editor of the *Journal of the Arnold Arboretum* and as senior curator of the Arboretum collections, Dr. Kobuski served and helped every staff member. His efficiency, his hard work, his knowledge, and his good humor were basic to our everyday activities. Although the diagnosis of Hodgkin's disease more than two years ago was known to all, his death was a personal loss to each of us. An account of his life and a list of his publications is being published in the *Journal of the Arnold Arboretum*.



Three new appointments were made during the year. Dr. Theodore R. Dudley joined the staff as Assistant Horticultural Taxonomist on May 1, after completing studies on the genus *Alyssum* at the University of Edinburgh. Dr. Mary E. Sanders was appointed Research Associate for one year to complete her studies of the cytology and genetics of *Sorghum*, using the Arboretum facilities. Mr. William Grime was appointed Curatorial Assistant in February, 1963. Dr. Wood completed a one year appointment as supervisor of the Harvard University Herbarium Building. In addition, Miss Dulcie A. Powell, of the Institute of Jamaica, Kingston, Jamaica, was awarded a Mercer Research Fellowship for the year, to work on the history of early plant introductions and the history of the garden of Hinton East, in Jamaica. The appointment of Dr. Lalit M. Srivastava as Mercer Research Fellow was renewed to permit him to continue his studies of the cambium and its vascular derivatives. Mrs. Claude Weber was awarded a James R. Jewett Fellowship from the funds of the Arnold Arboretum, to support her work on the genus *Chaenomeles* for the year.

Mr. Don M. A. Jayaweera, having completed a series of studies of the genus *Mussaenda* and his tenure as a Mercer Research Fellow, returned to his position as Superintendent of the Royal Botanic Gardens, Peradeniya, Ceylon. Dr. Wallace R. Ernst, who has been working on the generic flora of the southeastern United States, under Dr. Wood's direction, resigned at the end of the fiscal year to accept a position at the United States National Museum.

Several members of the staff received honors or special committee assignments during the year. Dr. Donald Wyman was appointed chairman of the Awards Committee of the American Horticultural Society and was elected vice-president of the International Dendrological Union. Dr. Shiu-Ying Hu was one of two individuals selected as the first honorary members of the Korean Botanical Society. Mr. Peter Green was appointed to the committee of the International Organization for the Study of the Taxonomy of Cultivated Plants. This committee, formed at the XVI International Horticultural Congress, will function as an organization within the International Association for Plant Taxonomy. Dr. Schubert was appointed to the Publications Committee of the Association for Tropical Biology.

### Horticulture:

The past year was notable for its cool summer and a winter made scenically beautiful by a series of ice storms. Unfortunately, these same storms severely damaged many flower buds and killed to the ground plants of *Ilex*, *Weigela*, and *Deutzia*. This damage to particular genera was common in the northeastern states and also occurred as far west as Ohio. One storm in January that began as a freezing rain coated all plants with ice which persisted for seven days in protected locations. Fortunately no wind accompanied this storm, and breakage of branches was minimal. This was but one of seven occasions in January and February when ice coated the living collections for periods exceeding 24 hours. In contrast



to the damage to above-ground portions of these genera, the quality and time of flowering was noticeably altered in *Forsythia*, *Magnolia*, and the azaleas. On the other hand, these same winter conditions appear to have favored the ornamental crab apples which flowered profusely nearly a week ahead of their normal time, the lilacs which persisted in peak of bloom for nearly two weeks, and the evergreen rhododendrons which seemed more floriferous than usual.

Two major improvements were made on the grounds during the year. The Department of Parks and Recreation of the City of Boston continued its program of road improvements in the Arboretum, completing the resurfacing of a section of road near the *Fagus* collection and the circular road on Peters' Hill. The top of Peters' Hill, one of the highest points in Boston, has often been suggested as an ideal point for a vista over the Arboretum grounds. Previously only accessible in dry weather, the Department of Parks and Recreation has now begun an all-weather roadway to the area. Two large dry wells were built to handle the road drainage and the approach road has been started. Eventually a circular drive, forming a turn-around at the top of the hill, will make this area easily available to visitors.

A division of costs with the City of Boston permitted the installation of a new concrete storm sewer across the lower portion of the greenhouse tract of land from Centre Street to the linden collection. The existing ancient sewer had collapsed in places, creating a hazard to visitors and permitting flooding in the *Tilia-Aesculus* collections after heavy rains.

The meadow area of the Arboretum in front of the Administration Building, has been subject to flooding in recent years, and the resulting high water table has had a damaging effect on the meadow-road plantings. With the installation of the storm sewer at the greenhouse area the water level in the meadow can be controlled by cleaning out the silt-filled ditches. This effort succeeded in improving the drainage pattern so that the water table was reduced by one foot.

New gates, installed at the Bussey Street entrances to the conifer collection and to the Peters' Hill area, not only improved the appearance of these areas, but has allowed better control of the properties during off hours. A fence was placed along South Street and around the property at 383 South Street for increased protection of this entrance to the grounds.

The area behind the Administration Building which was largely occupied by mass plantings of *Forsythia* and *Cornus* was cleared in part, to allow room for expansion of the *Magnolia* collection. Opposite the Administration Building and adjacent to the Arborway, another area was cleared during the winter to improve the growth of the willow collection and to allow the establishment of plantings of colorful azaleas which will be visible across the meadow in the future. The wooden trellis holding many of the climbing plants in the Arboretum collection was in need of repair and now has had most of the overhead cross pieces replaced.

An unusually large amount of compost and mulch materials, as well as of top soil, became available in the Boston area during the year and was



purchased or accepted as gifts, with gratitude. This was placed on the living collections or stock-piled for future use. The large supply of cocoa shells resulted from the closing of a cocoa processing plant which in recent years has made available large amounts of valuable mulching material. Again, we must renew our search for additional low-cost mulch material.

In the previous fiscal year the efforts of the grounds staff were concentrated on removing Arboretum collections from the property of the Bussey Institution, in re-establishing the hedge collection, and on landscaping the greenhouse area. With this work completed during the autumn months, the work described above could be undertaken and the regular planting program renewed. During the year over 500 specimens of trees and shrubs from the nurseries at the Case Estates were planted in the collections at Jamaica Plain.

During the spring we completed the first year of operations in the Charles Stratton Dana Greenhouses. As these structures differed in size and plan from those formerly used it was expected that a period of adjustment to the new physical arrangements and environments would be required. Greenhouses do have individual environmental characteristics and the experimental program of the past year has indicated the methods of optimal use of each. A mist propagation system, formerly out-of-doors and usable only in the summer months has been established in one house; a second house is devoted to plastic tent propagation techniques as well as the processing of seeds and the grafting of plants; while the third house contains the teaching and research collections used by the staff. The new class facilities of the Dana Greenhouses were used by Mr. Fordham in conducting a plant propagation class of ten sessions. The laboratory for cytology and morphology has been used by Dr. Sanders and other members of the staff.

Two of our interesting collections were enhanced by special gifts. Through the kindness of Mr. William T. Gotelli, of South Orange, New Jersey, Mr. Fordham was able to obtain propagating material of 84 dwarf or abnormal conifers not previously represented in our collections. Mr. Gotelli had previously donated 20 cultivars of tree peonies in 1958, and an additional 14 in 1961. During this year his gift of 34 more cultivars has been added to the collection located near the *Viburnum* plantings. In this locality the plants have prospered and, in the spring, flowered profusely.

The activities of the men in the plant propagation area of our operations are practical and experimental, concerning both the established plants and the introduction of new taxa. Some of the very old plants in the Arboretum are approaching senescence, while others are failing because of storm damage or insect attacks. Regular surveys of the grounds are made to locate and propagate such plants for replacements. Plants which have done well but are few in number are also propagated for proper preservation or display. During the year 382 species and varieties in our established collections were processed for such reasons. In addition, new taxa were received for trial as living plants, cuttings, or seeds. During



the past fiscal year the Arboretum received 174 shipments of plant materials representing 700 species and varieties from 14 countries, not including the United States, and 80 shipments of seeds representing 132 taxa from 24 countries, not including the United States. To aid the staff in taxonomic or analytical problems 172 different kinds of plants were propagated. To acquire propagation data on species difficult to reproduce 74 taxa were handled experimentally.



PAEONIA cv. HUKUO-JASHI. One of the most floriferous of the tree peonies in the collections of the Arnold Arboretum.

Still another aspect of the work of the plant propagation staff is the distribution of plant materials for hardiness trials, for other experimental purposes on request, or as gifts or exchanges when the required material is not readily available from other sources. During the year the shipments of plants as living specimens, including seeds, numbered 321 shipments comprising 1227 species and varieties to a total of 15 different countries. The cost of this aspect of our activities in labor, supplies, and postage is compensated by the receipt of equivalent materials in exchange from other organizations, by similar cooperation for our research needs, and by the invaluable factor of the good will established both in the United States and abroad.

The program of plant distribution to cooperating nurserymen described in previous reports was continued during the year by making available twelve authentically identified species and varieties of plants with outstanding horticultural characteristics. Thirty-five nurseries and botanic



gardens in 25 states and 5 foreign countries requested materials from a list supplied to them. Fulfilled requests for specific materials amounted to 123 shipments of 442 taxa to nurseries and botanic gardens. Unusual requests for soil samples; plant parts for analysis, cancer chemical screening, or animal nutrition studies; preserved stems, or flowers, or pollen for breeding programs represented shipments of 639 taxa during the year.

Surplus plants were supplied for three widely separated hardiness trial programs of interest to the staff of the Arboretum. The Vermont Agricultural Experiment Station, Burlington, Vermont, received 70 species and varieties over the past two years; the Regional Plant Introduction Station, Ames, Iowa, was sent 51 different kinds of plants for trial and evaluation in the North Central Regional Plantings of the Ornamental and Shelter Plant Introduction Program. Other plants for tolerance of hardiness experiments were sent to the Mustilla Arboretum, Elimaki, Finland, the northernmost arboretum in the world, and to gardens in Puerto Rico, Trinidad, and Honduras for checking of their tolerance of heat.

We receive requests from newly formed arboreta for surplus plants, or specific plants, and attempt to aid these institutions as well as schools which request material to diversify their plantings for educational purposes. During the year we supplied collections ranging in number from 17 to 150 species and varieties to such places as the Bristol County Agricultural School; the town committees of Chelmsford and of Weston, Massachusetts; the Meeting House School, West Rindge, New Hampshire; and Union College in Schenectady, New York. A specific request for plants cultivated in the 18th century in New England was received from the Board of Managers of historic Gore Place, in Waltham, where an attempt is being made to recreate the original landscaping of the grounds. A number of species and a few available old cultivars were supplied as a gift.

Work in the taxonomy of cultivated plants is a major effort of the staff. One recent issue of *Arnoldia* described the new cultivars registered by the Arboretum during the past year. A new registration list of cultivars for *Chaenomeles* and a supplementary list for *Syringa* were published. Some of the new cultivars and recent introductions received by the Arboretum present special taxonomic problems. Mr. Green undertook a survey of a selected number of the plants introduced to the Arboretum in recent years to check the nomenclature adopted. Some interesting problems encountered will be discussed by him in papers in appropriate journals later.

Two machines for preparing labels were purchased during the year to add efficiency to our methods of labeling specimens in the living collections. An electrically operated Graphotype Embosser, manufactured by the Addressograph Company, will replace the more limited hand-operated machine used previously. A Green Pantograph Engraver was purchased to prepare labels from black and white laminated plastic for collections of small-sized plants. Such labels have been placed on the lily test-plots, the ground covers, and perennial garden collections in Weston, and on the *bonsai* and dwarf conifer collections at the Dana Greenhouses. Both ma-



chines produce attractive resistant labels at greater speed than could be realized by our former techniques.

### Case Estates:

During 1963 the town of Weston, the location of the Case Estates of the Arnold Arboretum, marked the 250th anniversary of its founding. The staff of the Arboretum was asked to cooperate by assisting in the committee work for the occasion and by scheduling the annual Open House at Weston during the celebration by the town. The Arboretum is fortunate in occupying a prominent geographic position in this lovely town and is aware of its privileges and its responsibilities as a tax exempt organization there. Dr. Wyman has served for many years on the park, cemetery, and the beautification committees of Weston. He has also assisted in the design of a new park area. The Arnold Arboretum has contributed 150 trees and shrubs for the landscaping of it and other localities in the town. Dr. Howard, Dr. Wyman, and Mr. Draper, all resident on the Case Estates, were responsible for tours of the Estates during the anniversary celebration.

The plantings of the Case Estates are always open to residents of the town, and many of them take advantage of the labeled displays for study, or participate in the classes and tours offered. Main roads of the town pass along the boundaries of the Case Estates and road-edge plantings of crab apples, established in recent years, reached a peak of bloom this year in time for the ceremonies.

A committee of the town of Weston concerned with the identification of the oldest houses for the anniversary celebration, verified the location of its fifty oldest buildings. One Arboretum house, at 131 Wellesley Street, was built by or for Thomas Rand in 1790, and is now identified on town maps and marked by a bronze plaque. The town has requested that all measures be taken to insure the preservation of these historic buildings.

During the year, Dr. Scott Pauley and Mr. Albert Johnston, representing the Cabot Foundation, examined the clonal collections of trees which have been maintained on the Case Estates for a number of years. Their report compares the same genetic material planted in twenty-five test locations in Massachusetts. There are numerous clones of *Populus* and *Pinus*, and smaller numbers of other genera. The species and hybrids, as well as the selections for geographic areas, including altitudinal variations, could be compared when grown in pure stands or in various combinations in one test plot. Over the years of their existence the plots have shown survival ratios from zero to ninety percent for the material outplanted in Weston and reveal definite indications of potentially profitable breeding combinations, not only for growth, but for hardiness and borer and weevil resistance. The test plots were originally established on standard planting intervals for trunk development. The most promising plants have now been propagated, following the Scott and Johnston report, for growth as specimen plants both in Jamaica Plain and in Weston. The value of these plants lies in the detailed genealogical records and the long and careful selection studies which document them.





ABOVE: A frame house built around 1791 by or for Thomas Rand is located on the Case Estates of the Arnold Arboretum in the town of Weston.

BELOW: A commemorative plaque, donated by the town of Weston and placed on one of the houses of the Case Estates, marks it as one of the 50 oldest buildings in the town.



**Herbarium:**

Additional competent help became available during the year, making possible a major effort to distribute duplicate specimens to herbaria with appropriate interests. In recent years this aspect of our taxonomic work has had to be neglected in favor of the reorganization of the herbarium and the insertion of mounted material. In contrast to the previous fiscal year, when only 483 specimens were sent out in exchange, 24,482 specimens were distributed during the fiscal year just ended. These constituted primarily collections from Indochina and from New Guinea, made by Arboretum-sponsored expeditions immediately after the close of World War II. The Arboretum received during the year 35,431 specimens, either in exchange, or by subsidy, gift, or purchase. The largest single collection included was from Dr. Hugh Raup of the Harvard Forest, a collection made by him in 1948 in Alaska and the Yukon Territory, when he was a staff member of the Arboretum. Particularly valuable material was received from Mr. Myoshe Furuse as a set of 1072 specimens collected on a subsidy. Included in the total number of specimens received were 10,967 specimens obtained in exchange programs with other herbaria and 1900 specimens received as gifts or for identification. We are particularly grateful for valuable duplicates of historical collections received from the Muséum National d'Histoire Naturelle, Paris.

It is worthy of notice that the number of specimens of cultivated plants received for identification continues to increase. This is in part associated with the efforts of the staff in the registration of cultivars, for the nurseryman and the layman both are aware of the value of correctly identified plants. Fortunately, the majority of the specimens received are worthy of preservation and will therefore constitute an important part of the record of the distribution of cultivated plants. Other botanical gardens are now distributing specimens collected from the plants they have under cultivation, either for checking of the identifications or for records of growth in a certain area. Mr. Don M. A. Jayaweera, former Mercer Research Fellow, arranged for the Arboretum to receive a collection of specimens of plants currently under cultivation in the Royal Botanic Gardens, Peradeniya, Ceylon. The plants of this garden formed the basis of records for H. F. MacMillan's *Tropical Planting and Gardening*, and many of the species received were new records for our herbarium in Jamaica Plain.

During the year 19,112 specimens were mounted and added to the herbarium, bringing the total collection to 763,928 specimens. The research program of the staff requires the study also of herbarium specimens borrowed from other institutions. In the past year requests were made for 77 loans of specimens from 41 institutions, 22 in the New World and 19 in the Old World. The incoming loans totaled 4421 specimens, or an average of 57 sheets per loan. The staff received requests for the loan of its herbarium material from 51 institutions and sent out 128 loans averaging 145 specimens for a total of 18,643 sheets from the herbaria of the Arnold Arboretum and the Gray Herbarium.



In addition to the published papers the taxonomic staff has many research projects in progress. Dr. Brizicky is studying the generic limits within the Sapindales and Geraniales for the generic flora of the southeastern United States. He completed, in the past year, studies on the genera of Anacardiaceae and detailed studies on the generic limits of *Rhus*, as well as treatments of genera of the Sapindaceae, Aceraceae, Hippocastanaceae, Celastraceae, and Hippocrateaceae. Dr. Dudley completed field work in Turkey early in the summer and then organized the collections of that expedition. His field studies of *Alyssum*, made in the type localities of many of the species, produced 160 specialized collections of this genus. The specimens, as well as viable seeds, were basic to his monographic studies. Since *Alyssum* is well represented in the Near East he has agreed to prepare treatments for several regional floras being assembled by European colleagues.

Dr. Ernst completed treatments of Capparaceae, Moringaceae, Loasaceae (with Dr. H. J. Thompson), Hamamelidaceae, Platanaceae, Berberidaceae, Lardizabalaceae, and Menispermaceae for the southeastern flora project. Mr. Green continued his work on the Oleaceae, giving special attention to the genera *Osmanthus* and *Nestegis*. Dr. Howard received contrasting collections for special study during the year. One was of old specimens collected in the botanic garden at Saint Pierre, Martinique, before its destruction by the eruption of Mt. Pelée. The other was a collection made on Inagua, in the Bahamas, during the winter of 1962-63, which pointed out the immediate need for field work in areas threatened by the rapid expansion of tourism in the West Indies. Dr. Hu continued her work on the identification of the accumulated, incompletely identified Asiatic herbarium material received by the Arnold Arboretum. As these identifications are completed the duplicate specimens will be distributed to other herbaria. Dr. Hu has also been assisting botanists in Asia with the verification of identifications of specimens collected on Hong Kong and Quemoy. Quemoy, an embattled island, is closed to collectors and the materials under study were obtained by a Nationalist Chinese soldier stationed there. During his illness, Dr. Kobuski attempted to continue his work on the Asiatic species of *Ternstroemia*. Unfortunately much of this remains unfinished, but a few completed portions are being published posthumously.

Dr. Nevling had the opportunity of studying *Daphnopsis* species in Puerto Rico and continued his work on the family Thymelaeaceae. Dr. Perry is completing her studies of the medicinal plants of Southeast Asia and their various uses throughout their geographic range. Dr. Schubert, in addition to serving as editor of the *Journal of the Arnold Arboretum*, continued her studies of the genera *Begonia*, *Desmodium*, and *Dioscorea*. Dr. Wood, who is editing and coordinating the manuscripts prepared by various individuals for the generic flora of the southeastern United States, continued the direction of these studies, his own work in this area, and the compilation of the basic data and materials for the project. In addition to a number of peripheral papers, treatments of forty-eight families of flowering plants, comprising over 500 pages of the *Journal of the Arnold*



*Arboretum*, have been published since the series was begun. Dr. Wood has also continued his critical work in connection with the nomenclature of the families of seed plants.

### Library:

A notable increase in the use of the library during the year by students and visiting scholars was attributable, we believe, to the developing cross-reference system of file cards in the catalogue. This work has progressed slowly over the past few years and was reflected again this year in the statistical records of the librarian. Four hundred nineteen bound volumes were added to the library during the year, making a total number of 51,453. Of this number, 104 deal primarily with horticultural topics and are housed in Jamaica Plain. Five hundred eighteen items were added to the pamphlet collection, increasing its total to 18,926. Although 937 accessions were recorded by the librarian, the number of reference cards added to the main card catalogue totalled 1976, reflecting the effort of Mrs. Schwarten and her assistants to make the library of increasing value. The annual issues of the *Index to American Botanical Literature*, the *Card Index of American Plants* issued by the Gray Herbarium, and of the *Index Nominum Genericorum* issued by the International Association for Plant Taxonomy were all added to the existing files.

The librarian has also undertaken to arrange the available duplicate reprints of former staff members for eventual distribution as requested, and to prepare volumes of the collected works of former and present staff members. In many cases this has involved locating obscure periodicals not necessarily in our library and obtaining reproductions of the appropriate articles.

Several outstanding additions were made to the library resources during the year. Through the kindness of Mr. Philip J. McNiff, of the Harvard College Library, 92 of the original Linnaean Dissertations were obtained in an exchange program with the library of the University of Helsinki, in Finland. Between the libraries of the Arnold Arboretum and the Gray Herbarium, 132 of the original 186 Linnaean theses published are now available for research use. Also of special value are the manuscripts, photographs and documents used in the preparation of *The Lilac* and *Botanical Exploration of the Trans-Mississippi West*, which were a gift of the author, Mrs. Susan Delano McKelvey. During the year we were able to purchase the manuscripts and notes of Dr. A. K. Schindler, of Düsseldorf, Germany, whose work comprises studies of many genera of the Leguminosae. We acknowledge with gratitude the many other books and periodicals received as gifts, including a copy of *Flora Nasuensis*, edited by the Biological Laboratory, Imperial Household, and presented by Emperor Hirohito of Japan.

In a cooperative program with the Gray Herbarium, microfiche reproductions of the herbarium which formed the basis of the many volumes of the DeCandolle *Prodromus*, and of the herbaria of Thunberg and Burser, were purchased during the year.

Mrs. Schwarten continued her contribution to the preparation of the



Index to American Botanical Literature in cooperation with the editors of the *Bulletin of the Torrey Botanical Club*.

### Comparative Morphology:

The wood collection of the Arnold Arboretum received its usual curatorial attention during the year. A large collection of wood samples from the Fiji Islands, collected by Dr. A. C. Smith in 1947, was prepared for sectioning in a cooperative program with the Division of Wood Anatomy of the Smithsonian Institution, United States National Museum. In another cooperative program with the Department of Plant Anatomy, Order of Lenin Forest Academy, Leningrad, U.S.S.R., wood samples of a large number of specimens representing primitive or localized taxa were prepared. In all, 14 requests for anatomical material were processed during the year.

Irving W. Bailey, Professor of Plant Anatomy, *Emeritus*, has continued his research on the leaf-bearing cacti of the genera *Pereskia*, *Pereskopsis*, and *Quiabentia*, the results of which have been published in the *Journal of the Arnold Arboretum*. His research reveals incipient trends of phylogenetic specialization in these most primitive surviving representatives of the Cactaceae, which become increasingly accentuated in the Opuntieae and Cereae. Professor Bailey's grant from the National Science Foundation has been extended for a period of two additional years. His studies are now concerned with investigations of the formation of diversified forms of "sphaerites" induced in leaves of *Pereskia* and *Pereskopsis* during air-drying and alcoholic dehydration of specimens.

Dr. Lalit Srivastava, Mercer Research Fellow, has continued his studies on the ontogenetic and histochemical aspects of the cambium and its vascular derivatives. He has completed his studies of the secondary phloem of the Cactaceae and of the cambium and vascular derivatives of *Ginkgo biloba*. At present he is reviewing the anatomy, chemistry, and physiology of bark for the *International Review of Forestry Research*.

### Education:

Through the spring semester Dr. Howard taught a course in horticultural plant taxonomy in the Department of Biology. During the regular spring vacation this class continued its work in Puerto Rico, making its headquarters in the Luquillo Mountains and visiting the University of Puerto Rico, including its agricultural research stations, the forestry nurseries, and plantings of the U. S. Forest Service, as well as other areas of horticultural, agricultural, or floristic interest. The experiment of working with undergraduate students in tropical floras proved stimulating and successful to both instructors and students. The general collections that were made included five taxa new to Puerto Rico and many specimens needed for the herbaria of both native and of cultivated plants. Nearly 100 living plants were collected for growing in our greenhouses to serve as research projects for the students in the next semester.

The informal fall and spring classes conducted by the Arboretum staff were again held both in Jamaica Plain and Weston. Staff members also



participated in the seminar series held in the Harvard University Herbarium in Cambridge.

Mrs. Claude Weber completed, for the thesis requirement toward the



The mid-winter meeting of the Northeastern Section, American Society for Horticultural Science, included an inspection of the Charles Stratton Dana Greenhouses.



doctor of philosophy degree, a study of the genus *Chaenomeles*, under the direction of Dr. Howard.

The Northeastern Section of the American Society for Horticultural Science which for a number of years has held a mid-winter meeting in Cambridge, was invited to meet at the Arnold Arboretum. Scientific sections were held in the Administration Building, and an informal dinner was served in the Dana Greenhouses followed by reports of members who attended the International Horticultural Congress in Brussels. Dr. Howard and Dr. Wyman contributed to this meeting while Messrs. Ernst, Fordham, Green, and Wyman, and Mrs. Weber, all presented research papers during the meetings.

Dr. Howard gave the horticultural lecture at the annual meeting of the Garden Club of America, in Philadelphia, and was one of the speakers at the Clara B. Ford Garden Forum, at Greenfield Village, Dearborn, Michigan. He spent several days on the campus of West Virginia Wesleyan College as a guest speaker of the American Institute of Biological Sciences and visited the Inter-American University in San German, Puerto Rico, under the same sponsorship. Talks were also given at the University of Massachusetts and at Framingham State College. Dr. Wyman was a speaker at the annual meeting of the Garden Club Federation of Massachusetts, and at the Universities of Rhode Island, New Hampshire, and Massachusetts, and at Cornell University. Requests for special talks on street trees were received from arborist groups in central and northern New York, New Hampshire, and Massachusetts. These were filled by Dr. Wyman who discussed our trial plots in Weston. Messrs. Ernst, Fordham, Green, Williams, and Wood described the work of the Arboretum or talked about their own research in several seminars and various horticultural meetings.

#### **Exhibits and Displays:**

The Arboretum staff prepared four special exhibits during the past year. The largest, entitled "Woody Plant Seeds and their Germination," was the Arnold Arboretum display at the Spring Flower Show of the Massachusetts Horticultural Society. This educational exhibit was designed to show the various methods of seed production and dispersal, seed processing, including treatments for the several types of embryo dormancy, and comparative growth rates of seedlings. The background of this display consisted of mature plants (forced into bloom) of many of the seeds exhibited. The exhibit was planned for convenient study and visitors took advantage of this. The staff was pleased to receive a first prize and a gold medal from the Massachusetts Horticultural Society for its exhibit and to be recipients of the Buckley Medal of the Garden Club of America for the most educational exhibit in the show.

The staff assisted the Horticultural Committee of the Garden Club of America in preparing an educational exhibit on the propagation of herbaceous and tree peonies which was displayed at the Spring Show of the New York Horticultural Society. At the National Capitol Flower and Garden





The exhibit of the Arnold Arboretum at the Spring Flower Show of the Massachusetts Horticultural Society, Revere, Massachusetts, March 16-24, 1963, featured the types of seeds of woody plants and their methods of germination. This exhibit was awarded the Buckley Medal of the Garden Club of America for the most educational display.

Show, in Washington, D.C., the Arnold Arboretum joined other arboreta in an exhibit of which our portion featured hedge plants and two series of kodachrome transparencies of plants and plantings in the Arboretum. In the fall of 1962, a display of plants producing colorful foliage or fruits was arranged for the Fall Show of the Massachusetts Horticultural Society.

#### **Travel and Exploration:**

The Arboretum was represented by one or more staff members at various professional meetings including those of the American Association of Botanical Gardens and Arboretums, the American Horticultural Society, the American Institute of Biological Sciences, the American Nurserymen's Association, the American Society for Horticultural Science, the XVI International Horticultural Congress, the National Association of Gardeners, and the Plant Propagators Society. In each case a staff member gave a research paper or presided at a sectional meeting. When these meetings were held in areas outside of Massachusetts staff members were able also to visit nearby Universities, botanical gardens or arboreta, or to undertake field work.

Drs. Howard and Wyman attended the International Horticultural Congress held in Brussels, Belgium, during August. Dr. Howard presided at a meeting and symposium sponsored by the International Association of Botanical Gardens. En route to and from the meetings he visited gardens and herbaria in England and France. Dr. Wyman visited gardens



in England, Holland, Germany, France, and Switzerland, in addition to those visited during the Congress tours.

Dr. Wood attended meetings of the Association of Southeastern Biologists at the University of Florida, in Gainesville, and collected herbarium material and living plants in northern Florida in connection with his work on the generic flora of the southeastern United States. Drs. Howard and Nevling made general collections in Puerto Rico, but each also put special emphasis on the accumulation of field data on species of *Coccoloba* and of



The general assembly meeting of the 16th International Horticultural Congress held in the Palais du Congres, Brussels, Belgium.

*Daphnopsis*, in connection with their respective research programs. Dr. Hu visited several collections of *Ilex* and *Sorbus* in Washington and Oregon. Mrs. Weber visited nurseries and arboreta along the East Coast to study the flowering characteristics of *Chaenomeles*. Dr. Ernst continued with Dr. H. J. Thompson, of the University of California in Los Angeles, their program of field work in Texas in connection with studies of Loasaceae. Dr. Howard attended the Neotropical Botany Conference at the Imperial College of Tropical Agriculture, Trinidad, and had the opportunity of collecting selected species in Barbados, Curaçao, Aruba, and Bonaire, en route, applicable to his research program on the plants of the Lesser Antilles. Mr. Fordham made a special trip to collect abnormal forms from native populations of *Taxus*, *Juniperus*, and *Pinus* in New Hampshire and Massachusetts. It is hoped by study of these collections to determine the nature and origin of similar abnormal forms occurring under cultivation.



### Gifts and Grants:

The many Friends of the Arnold Arboretum renewed their generous support of the horticultural work during the year. We are most appreciative of this continuing annual generosity. Although most gifts are unrestricted, two were gratefully accepted for the care of the Larz Anderson *bonsai* collection and for the care and acquisition of dwarf conifers. A gift from the Boston Edison Company was accepted to complete the collection of street trees maintained in Weston.

The library was enriched with many gifts of individual volumes which are acknowledged as received. Mrs. Susan McKelvey presented to the library the records she has maintained supporting and supplementing her published work on the lilac, and on botanical exploration of the western United States. A large number of botanical journals comprising a gift from Mr. R. W. St. Clair, were particularly useful in replacing several worn volumes. Mr. Edwin Menninger, of Stuart, Florida, presented to the Arboretum the original colored photographs used in preparing his book *Flowering Trees of the Tropics*. This collection has been mounted and placed in the herbarium where it will be of value in complementing herbarium specimens of cultivated plants used constantly for study and demonstration.

Continuing support of the research projects of various staff members by grants from the Public Health Service, the National Research Council, and the National Science Foundation is acknowledged here, and as usual, in the various reports and papers resulting from the research. The project concerned with preparation of a generic flora of the southeastern United States received an additional grant from the National Science Foundation for three years, beginning in September, 1962.

Gifts of plant materials are received annually from many botanic gardens and nurseries to complete or supplement the representation in our living collections. Outstanding collections received during the year were specimens of the genera *Chaenomeles*, *Hosta*, *Lilium*, and *Paeonia* as well as various dwarf conifers.

### Publications:

Results of much of the scientific work of the staff is published as research papers in the *Journal of the Arnold Arboretum*. Dr. Wood, who has very ably edited the *Journal* for the past five years turned over this responsibility to Dr. Schubert in January. The four numbers issued during the past fiscal year included 543 pages, containing 31 articles, 25 of which were written by staff members. The six articles by other scientists concerned, in some way, the various collections maintained by the Arnold Arboretum.

The twelve numbers of *Arnoldia* edited by Dr. Wyman and issued during the past fiscal year contained but one article not prepared by a member of the staff. The articles in *Arnoldia* which drew the most attention were reports of the results of trial plots of ground-cover plants and of street-tree plantings as grown in Weston; the first registration list of



cultivars in *Chaenomeles*; and two supplementary lists of cultivars recently registered.

During the year the page proof of the *International Directory of Botanical Gardens* was read. Publication of this directory by the International Association for Plant Taxonomy is expected during the summer of 1963.

### Bibliography of the Published Writings of the Staff and Students July 1, 1962–June 30, 1963

- BAILEY, IRVING W. Comparative anatomy of the leaf-bearing Cactaceae, VI. The xylem of *Pereskia sacharosa* and *Pereskia aculeata*. Jour. Arnold Arb. **43**: 376–388. 1962.
- . Comparative anatomy of the leaf-bearing Cactaceae, VII. The xylem of *Pereskias* from Peru and Bolivia. Jour. Arnold Arb. **44**: 127–137. 1963.
- . Comparative anatomy of the leaf-bearing Cactaceae, VIII. The xylem of *Pereskias* from southern Mexico and Central America. Jour. Arnold Arb. **44**: 211–221. 1963.
- . Comparative anatomy of the leaf-bearing Cactaceae, IX. The xylem of *Pereskia grandifolia* and *Pereskia bleo*. Jour. Arnold Arb. **44**: 222–231. 1963.
- (with SRIVASTAVA, LALIT M.) Comparative anatomy of the leaf-bearing Cactaceae, V. The secondary phloem. Jour. Arnold Arb. **43**: 234–278. 1962.
- BRIZICKY, GEORGE K. The genera of Anacardiaceae in the southeastern United States. Jour. Arnold Arb. **43**: 359–375. 1962.
- . Taxonomic and nomenclatural notes on the genus *Rhus* (Anacardiaceae). Jour. Arnold Arb. **44**: 60–80. 1963.
- DUDLEY, THEODORE R. Some new *Alyssa* from the Near East. Notes Bot. Gard. Edinburgh **24**: 157–165. 1962.
- ERNST, WALLACE R. The genera of Capparaceae and Moringaceae in the southeastern United States. Jour. Arnold Arb. **44**: 81–95. 1963.
- . The genera of Hamamelidaceae and Platanaceae in the southeastern United States. Jour. Arnold Arb. **44**: 193–210. 1963.
- . The genera of Papaveraceae and Fumariaceae in the southeastern United States. Jour. Arnold Arb. **43**: 315–343. 1962.
- & THOMPSON, HENRY J. The Loasaceae in the southeastern United States. Jour. Arnold Arb. **44**: 138–142. 1963.
- FORDHAM, ALFRED J. *Albizia Julibrissin rosea* and its propagation. Am. Nurseryman **117**(10): 7, 79, 80. 1963.
- . Four fathers of the Sargent hemlock. Am. Nurseryman **116**(12): 9, 89, 90. 1962.
- . Methods of treating seeds at the Arnold Arboretum. Proc. Int. Plant Propagators Society. Combined Proc. **1962**: 157–162.
- . Winter survival of some difficult cuttings. Proc. Int. Plant Propagators Society. Combined Proc. **1962**: 124–125.
- GREEN, PETER S. The identity of *Jasminum absimile*. Baileya **10**: 53–55. 1962.
- . Plant introduction by the Arnold Arboretum. Quart. Newsletter Am. Assoc. Bot. Gard. **52**: 11–15. 1962.